

# Engineering With Nature



**Cynthia J. Banks**

**Research Biologist/Program Manager  
Engineer Research and Development Center**

**BG Hill & SWD Commanders Visit  
16 January 2015**

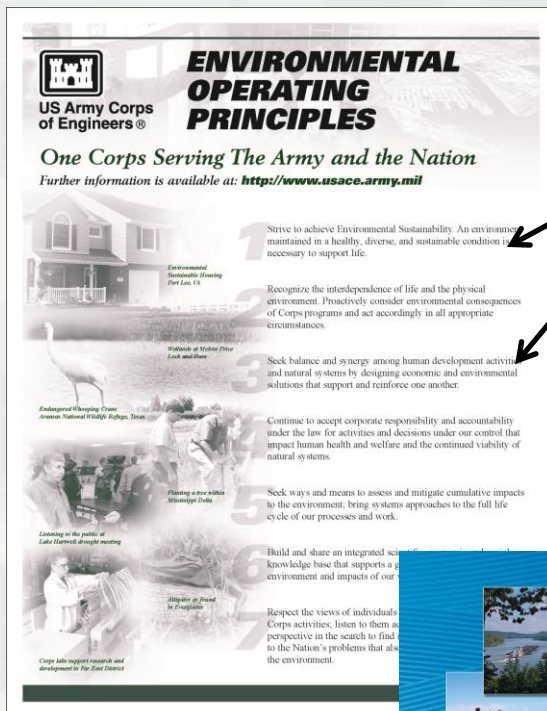
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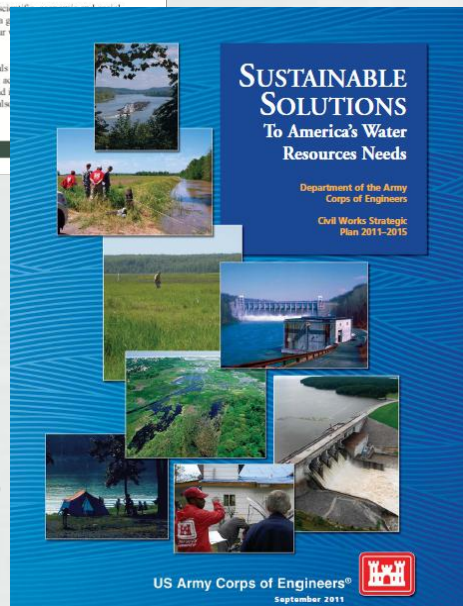
**US Army Corps of Engineers  
BUILDING STRONG®**



# Evolving USACE Practice



Sustainable Solutions Vision: “Contribute to the strength of the Nation through innovative and environmentally sustainable solutions to the Nation’s water resources challenges.”



## Goals:

- More efficient, cost effective engineering and operational practices.
- More collaboration and cooperation, less unproductive conflict.
  - ▶ Ports, commercial interests, regulators, NGOs, and others
- Sustainable projects. Triple-win outcomes integrating social, environmental and economic objectives.

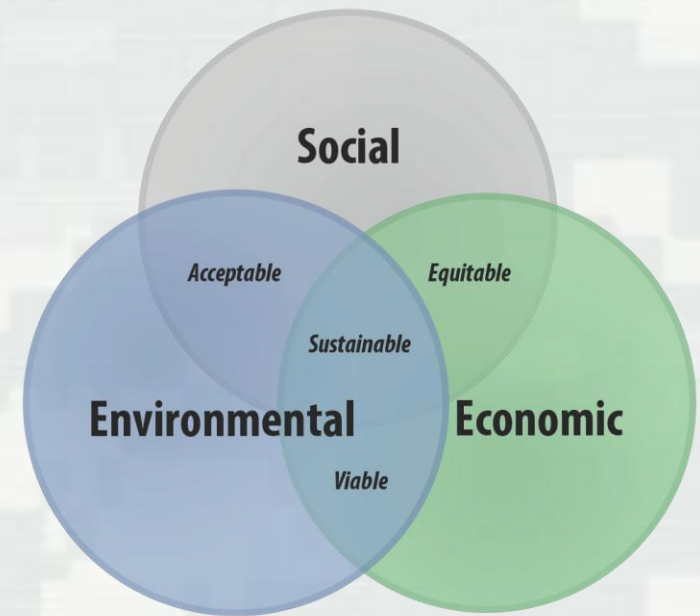


# Engineering With Nature...

***...the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes.***

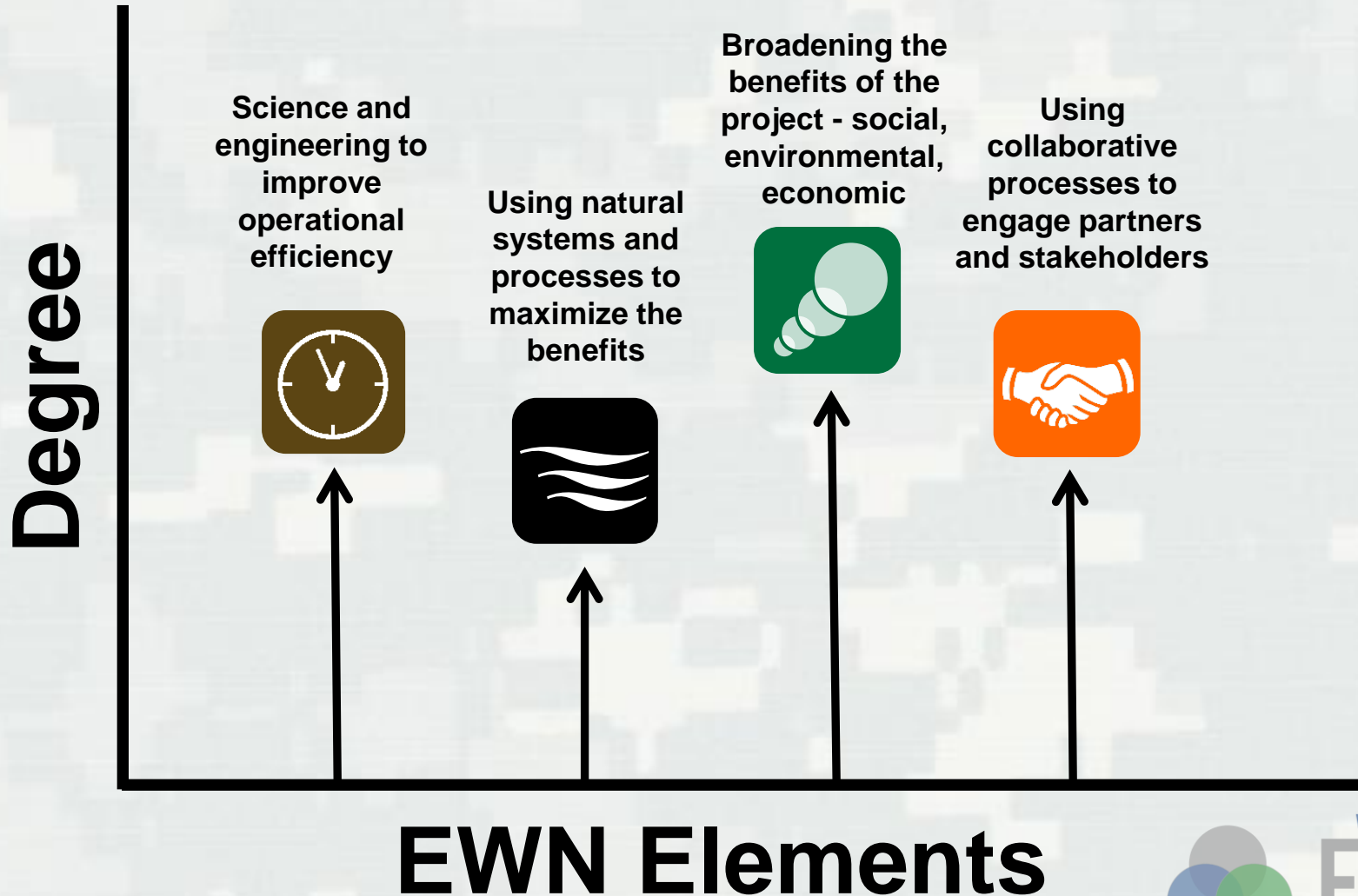
## Key Elements:

- Science and engineering that produces operational efficiencies
- Using natural process to maximum benefit
- Broaden and extend the benefits provided by projects
- Science-based collaborative processes to organize and focus interests, stakeholders, and partners





# EWN Elements



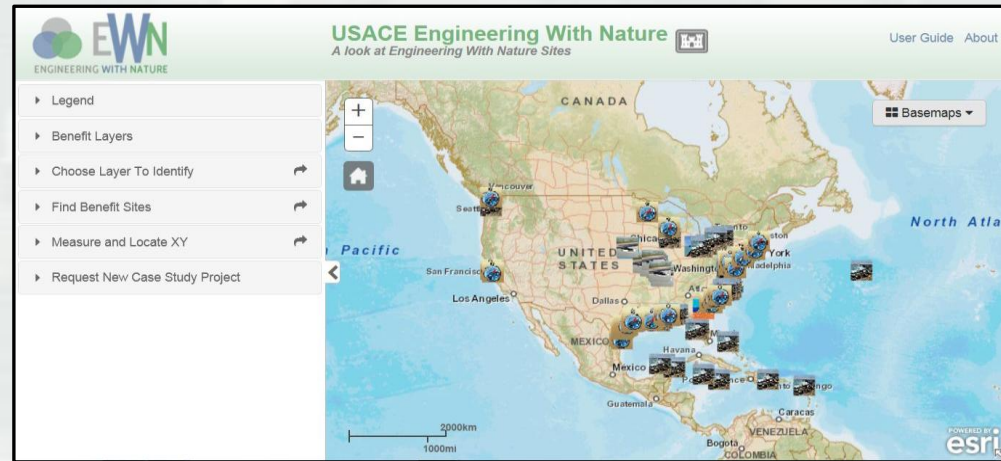
# EWN Status

- *Engineering With Nature* initiative started within USACE Civil Works program in 2010. Over that period, we have:
  - ▶ Engaged across USACE Districts (23), Divisions, HQ; other agencies, NGOs, academia, private sector, international collaborators
    - Workshops (>20), dialogue sessions, project development teams, etc.
  - ▶ Implementing strategic plan
  - ▶ Focused research projects on EWN
  - ▶ Field demonstration projects
  - ▶ Communication plan
  - ▶ Awards
    - 2013 Chief of Engineers Environmental Award (Natural Resources Conservation)
    - 2014 USACE National Award (Green Innovation)



# EWN Project Mapping Tool (EWN ProMap)

- Online GIS database of projects illustrating EWN principles and practices
  - ▶ Illustrating the key elements of EWN
- Currently contains ~175 projects
  - ▶ Name
  - ▶ Manager/Owner
  - ▶ Description
  - ▶ Infrastructure association e.g., jetty, breakwater, channel
  - ▶ Benefits e.g., fish habitat, bird habitat, recreation
  - ▶ Links, reports, photos
- Designed to facilitate communication about opportunities, lessons learned, and good practices
- Projects examples can be added through a process of self-nomination and independent evaluation

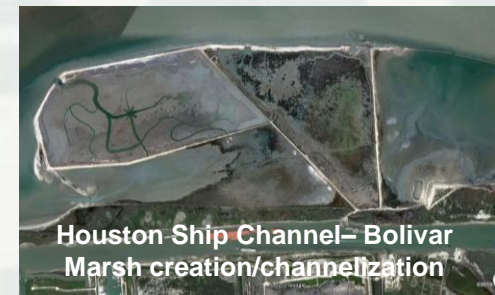


<http://gis2.sam.usace.army.mil/applications/opj/v013/>





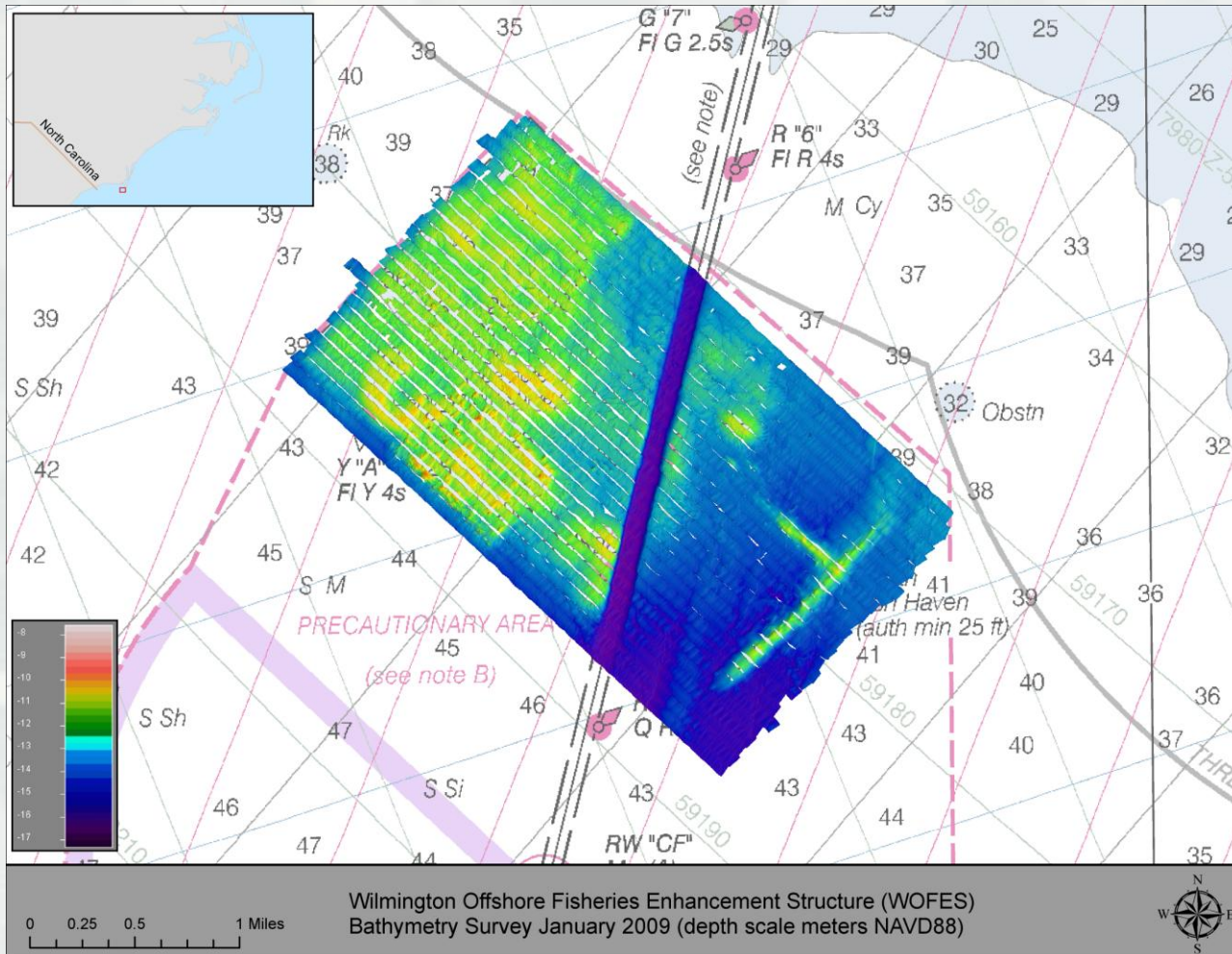
# Example EWN Solutions



**Notable SWG Beneficial Use Projects**



# Example EWN Solutions



## Wilmington Offshore Fisheries Enhancement Structure





# Example EWN Solutions

## Ashtabula Breakwater Tern Habitat



# Example EWN Solutions



**Upper Mississippi River Training  
Structures: Chevrons**



**River Bendway Weirs**



# 2013 EWN Action Demonstration Projects

- Sediment Retention Engineering to Facilitate Wetland Development (San Francisco Bay, CA)
- Realizing a Triple Win in the Desert: Systems-level Engineering With Nature on the Rio Grande (Albuquerque, NM)
- Atchafalaya River Island and Wetlands Creation Through Strategic Sediment Placement (Morgan City, LA)
- Portfolio Framework to Quantify Beneficial Use of Dredged Material (New Orleans and New England)
- Engineering Tern Habitat into the Ashtabula Breakwater (Ashtabula, OH)
- Living Shoreline Creation Through Beneficial Use of Dredged Material (Duluth, MN)
- A Sustainable Design Manual for Engineering With Nature Using Native Plant Communities





# 2014 EWN Action Demonstration Projects

- Landscape Evolution of the Oil Spill Mitigation Sand Berm in the Chandeleur Islands, Louisiana
- Guidelines for Planning, Design, Placement and Maintenance of Large Wood in Rivers: Restoring Process and Function (Collaboration with BoR)
- The Use and Value of Levee Setbacks in Support of Flood Risk Management, Navigation and Environmental Services (a strategy document)
- Strategic Placement of Sediment for Engineering and Environmental Benefit (an initial guide to opportunities and practices)



# *Engineering With Nature Across* **USACE**

- Collaborating with NAP, LRE, SPN, MVN, on using sediment to enhance coastal resilience
- SWG and LRB serving as “proving grounds” for district-wide integration of EWN principles and practices



# SWG: First EWN “Proving Ground”

- October 2014
- ~40 participants
- SWG, SWD, ERDC, IWR and HQ
- Identified opportunities to implement EWN within current and future projects





# Collaboration with USFWS on EWN and Endangered Species Act

- USACE spends \$300M per year on ESA compliance
- Combining ESA 7(a)(1) authority with EWN presents opportunity to reduce time and cost, while increasing benefits for species conservation



# Engagement with NGOs

- National Wildlife Federation
  - ▶ Use of EWN for conservation and NNBF
- Environmental Defense Fund
  - ▶ Coastal resilience investment
- The Nature Conservancy
  - ▶ Science for Nature and People (SNAP)- Integrating Natural Defenses into Coastal Disaster Risk Reduction
- National Fish and Wildlife Foundation
  - ▶ “Building Ecological Solutions to Coastal Community Hazards”
    - Collaboration with NJDEP, NWF, USACE, Sustainable Jersey, NJ Sea Grant Consortium

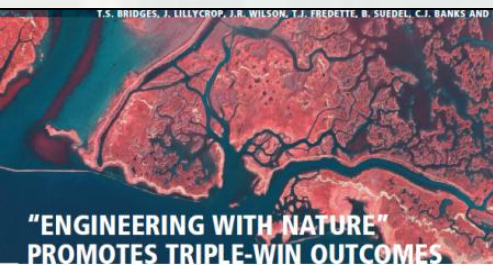
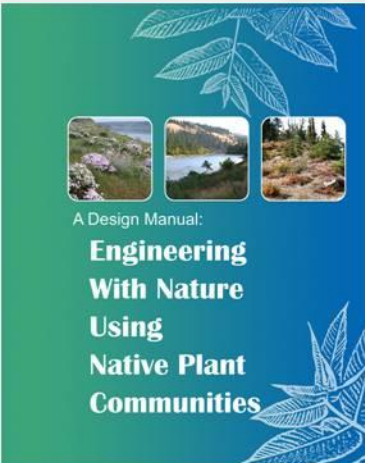


[www.engineeringwithnature.org](http://www.engineeringwithnature.org)





# Publications and Recognition



## ABSTRACT

The U.S. Army Corps of Engineers "Engineering With Nature" (EWN) initiative supports sustainable development of infrastructure by advancing technical and communication practices in order to intentionally align natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaborative processes. The tools and projects that have been developed through EWN support planning, engineering, and operational practices that benefitably integrate engineering and natural systems to produce more socially acceptable, economically viable, and environmentally sustainable projects.

## INTRODUCTION

Pursuing the objective of sustainable development of navigation infrastructure presents both challenges and opportunities for the U.S. Army Corps of Engineers (USACE). Advancing best practices will involve identifying the practical actions that can be taken to better align and integrate engineering and natural systems to produce more socially acceptable, economically viable, and environmentally sustainable projects. The EWN initiative's focus on developing practical methods provides an achievable path toward an ecosystem approach to navigation infrastructure development. By combining sound science and engineering with advanced communication practices, the EWN initiative is providing a robust foundation for collaborative project development. Engineering With Nature is being pursued through innovative research, field demonstrations, communicating lessons learned, and active engagement with field practitioners across a wide range of organizations. The objectives of EWN are consistent with those communicated in the

process (see [engineeringwithnature.org](#)). The EWN initiative's focus on developing practical methods provides an achievable path toward an ecosystem approach to navigation infrastructure development. By combining sound science and engineering with advanced communication practices, the EWN initiative is providing a robust foundation for collaborative project development. Engineering With Nature is being pursued through innovative research, field demonstrations, communicating lessons learned, and active engagement with field practitioners across a wide range of organizations. The objectives of EWN are consistent with those communicated in the

Author: Aerial photo of the wetlands at the Mississippi River Gulf Outlet taken in November 2013 as part of the EWN initiative's focus on developing practical methods provides an achievable path toward an ecosystem approach to navigation infrastructure development.



## ERDC environmental research supports USACE civil works, military missions

By Dr. Beth Fleming  
Director, Environmental Laboratory  
U.S. Army Engineer Research and Development Center

The U.S. Army Engineer Research and Development Center's (ERDC) Environmental Laboratory (EL) develops scientific and engineering work to develop sustainable solutions to the nation's civil and military environmental challenges. Researchers understand that solutions developed for civil works challenges can be leveraged to solve military challenges and vice versa. This interdisciplinary approach allows EL to focus on durable results for customers that require social, economic, and environmental benefits as part of a sustainable solution.

ERDC's scientific expertise in environmental research and risk and decision analysis is unique within the Army and Department of Defense. We are committed to sharing the application of these capabilities in a relevant way and demonstrating the environmental impact, risk, benefits and sustainability of new technologies and materials in all of our work initiatives. These such initiatives are the focus of this column. Environmental Life Cycle Assessment (ELCA) is an early initiative that will provide a comprehensive view of the environmental impacts from the development, production, use and disposal of Army materials and products. Green Remediation Technologies (GRT) is an initiative in the prototype phase that focuses on reducing the migration of hazardous constituents and Engineering With Nature (EWN) is a relative initiative that aligns natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaborative processes.

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For more information on green remediation technologies and sustainable design practices, please contact Elizabeth Ferguson, lead technical director for EWL at [Elizabeth.Ferguson@usace.army.mil](#). Engineering With Nature (EWN) is a USACE initiative that seeks to align natural and engineering processes to efficiently deliver economic, environmental and social benefits through collaboration. EWN's essential ingredients include science and engineering to produce operational effectiveness that support sustainable delivery of project benefits, natural processes to reduce demands on limited resources and maintain a project's environmental footprint, and innovative design to break down and extending the base of project benefits to include sustainable economic, social and environmental benefits, and science-based collaborative processes to organize and focus interests, stakeholders and partners to reduce social risks, resistance and project delays while producing more broadly acceptable projects. The capabilities developed through EWN are applicable and relevant across all USACE missions and business areas. The EWN initiative has achieved significant accomplishments since 2010.

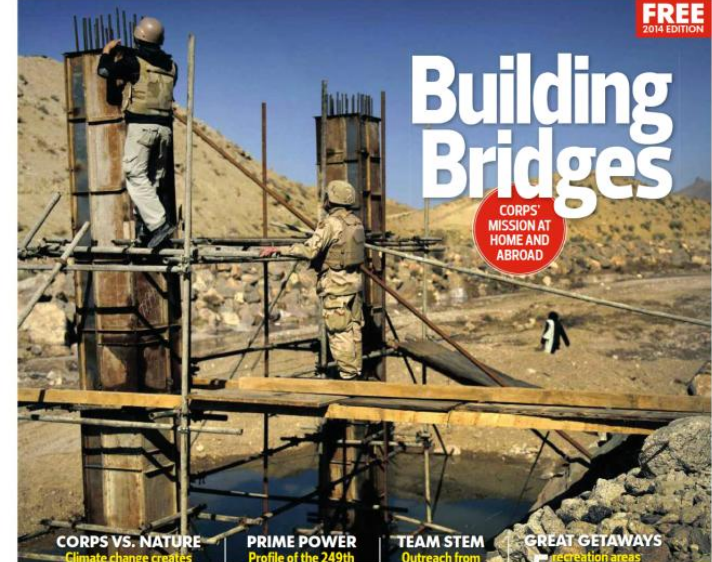
The Environmental Laboratory in conjunction with all ERDC laboratories, leverages expertise across disciplines, programs and programs to develop and address the most critical needs facing our nation today. Our research is informed by the needs and requirements of the warfighter and the nation. We are committed to providing innovative solutions for a safer, better world.



Supplement to Gannett Government Media Publications

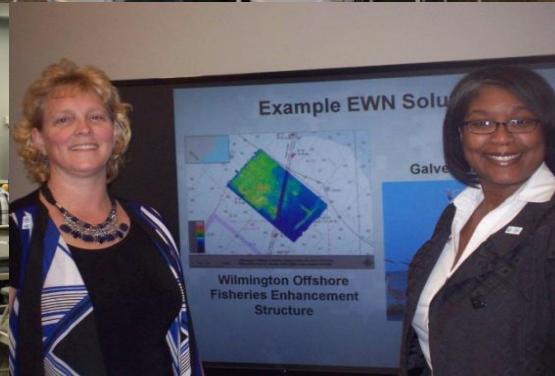
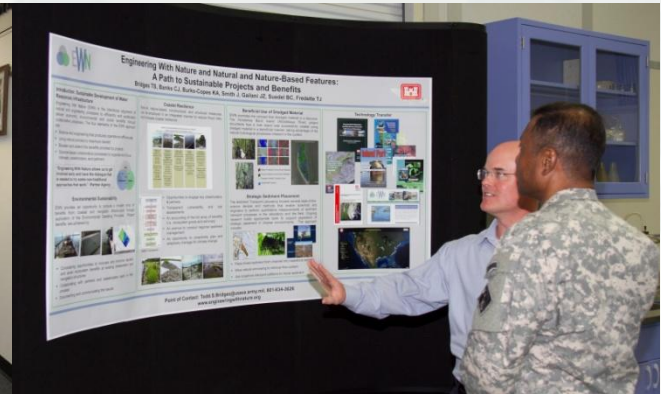


FREE 2014 EDITION





# Engagement and Workshops



# Creating Value by Engineering With Nature

- Value arguments resonate
- Correcting the hyper-focus on risk is achieved by giving more attention to compensating benefits
- There are potentially valuable allies in “unlikely” places
- Our projects have the potential to product multiple benefit streams but we have to claim them and share the stories!



[www.engineeringwithnature.org](http://www.engineeringwithnature.org)

